Dealing with Uncertainty: Using Scenario-Planning to Assess Risk and Develop Management Solutions in a Changing Climate

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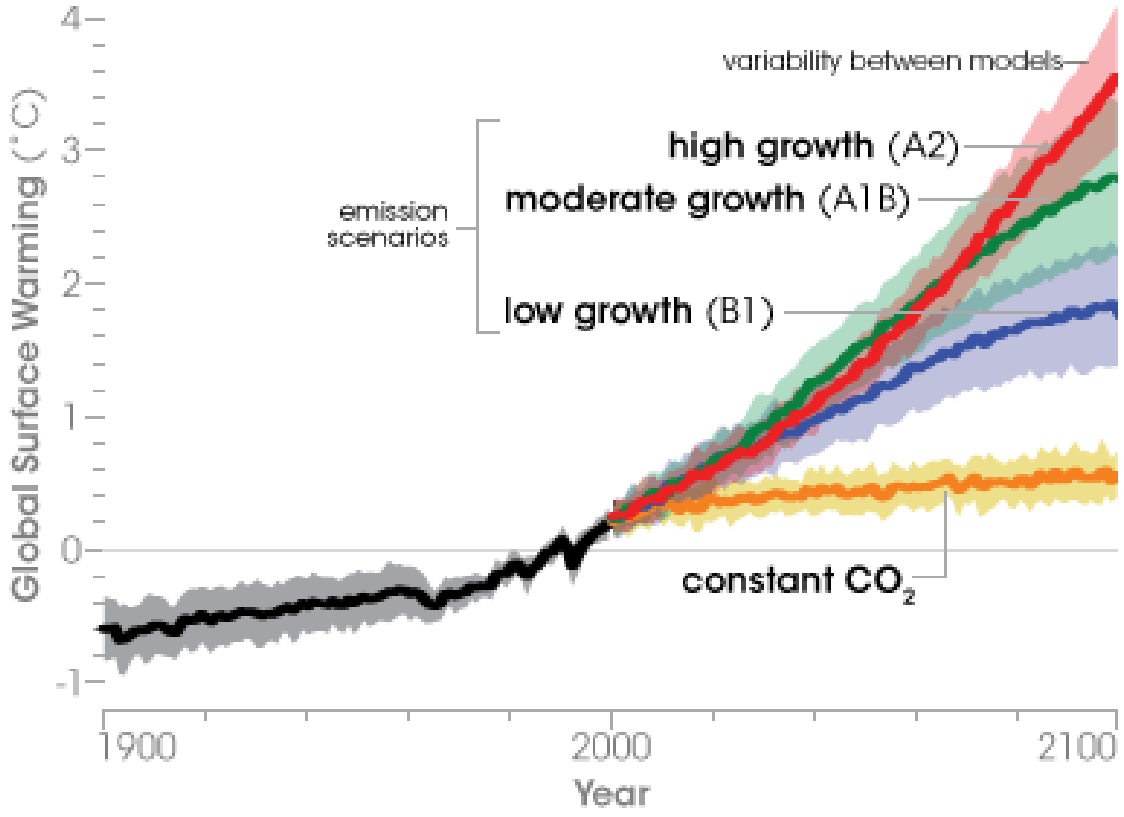
What is Scenario Planning?

- Developed during the cold war to prepare for a number of possible outcome

What are Alternative Future Scenarios?

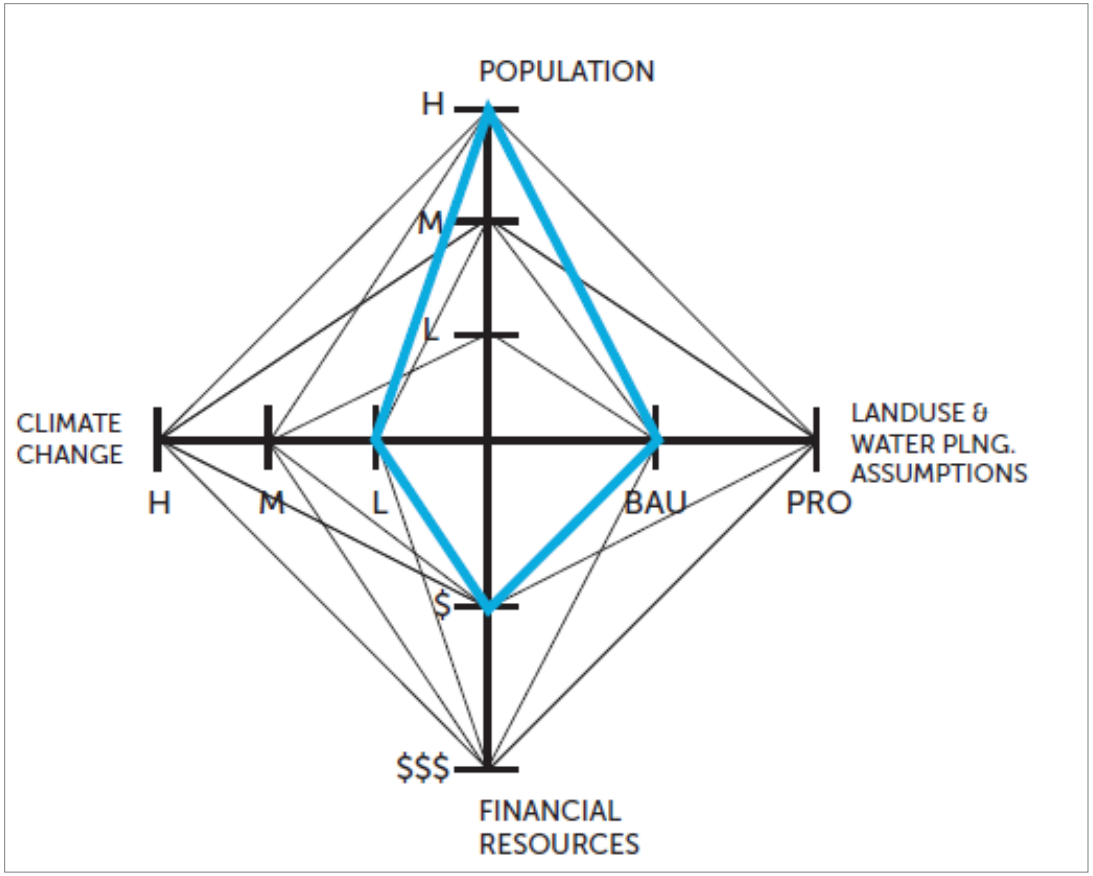
- IPCC Scenarios are another example:



Uncertainty

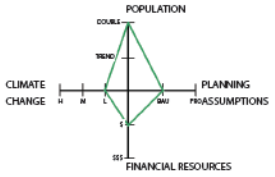
Dimensions

- Climate
- Political
- Economic
- Conservation
- …others

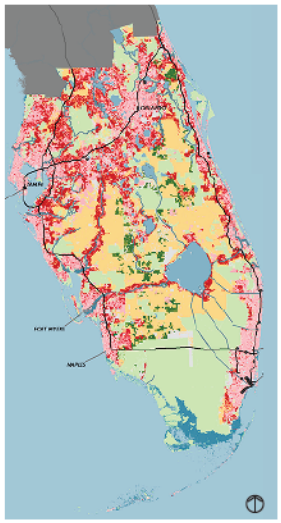


Scenarios

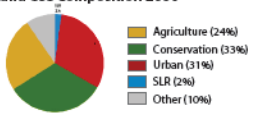
SUMMARY



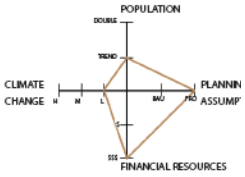
Scenario A Land Cover 2060



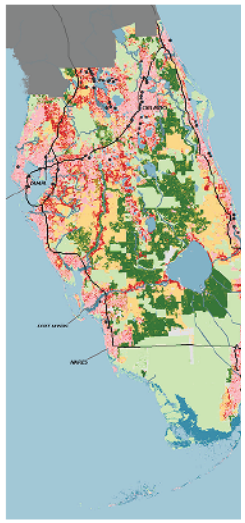
Land Use Composition 2060



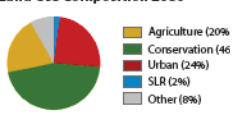
Total Land Use Area (in millions of acres)	2020	2040	2060
Agriculture	6.19	5.52	4.69
Conservation	6.00	6.16	6.32
Urban	4.51	5.20	5.98
Sea Level Rise	0.33	0.38	0.44
Other	2.26	2.03	1.86



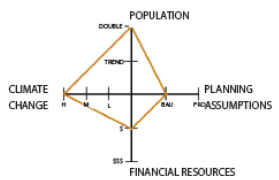
Scenario B Land Cover 206



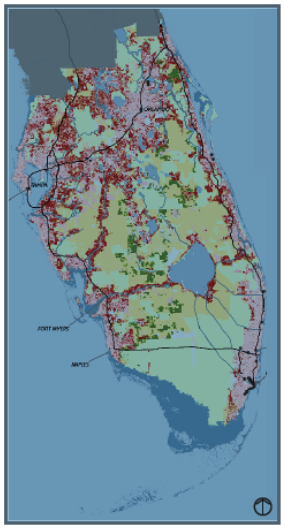
Land Use Composition 2060



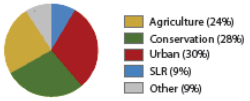
Total Land Use Area (in millions of acres)	2020	2040	
Agriculture	6.00	4.96	3.
Conservation	6.50	7.65	8.
Urban	4.29	4.47	4.
Sea Level Rise	0.33	0.38	0.
Other	2.18	1.83	1.



Scenario C Land Cover 2060

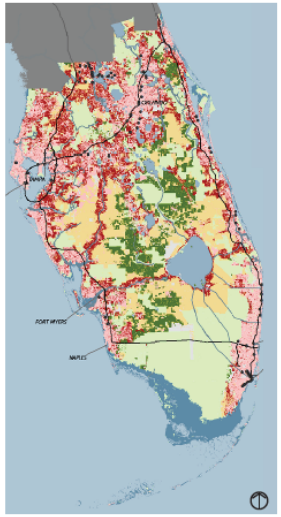


Land Use Composition 2060

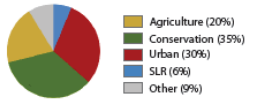


Total Land Use Area (in millions of acres)	2020	2040	2060
Agriculture	6.19	5.51	4.66
Conservation	5.77	5.40	5.40
Urban	4.48	5.09	5.81
Sea Level Rise	0.63	1.34	1.64
Other	2.22	1.95	1.77

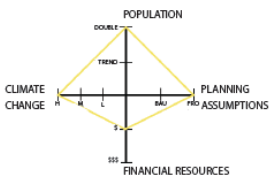
Scenario E Land Cover 2060



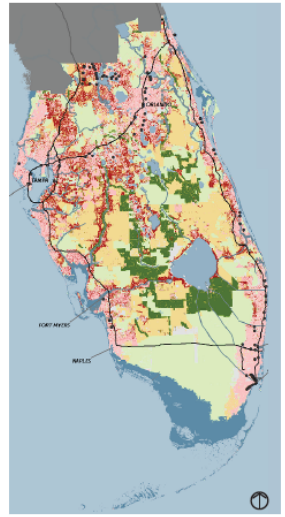
Land Use Composition 2060



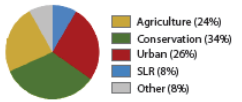
Total Land Use Area (in millions of acres)	2020	2040	2060
Agriculture	6.05	5.04	3.87
Conservation	6.12	6.40	6.69
Urban	4.47	5.10	5.83
Sea Level Rise	0.44	0.82	1.20
Other	2.21	1.92	1.70



Scenario I Land Cover 2060



Land Use Composition 2060



Total Land Use Area (in millions of acres)	2020	2040	2060
Agriculture	6.12	5.38	4.54
Conservation	5.97	5.99	6.39
Urban	4.37	4.70	5.05
Sea Level Rise	0.63	1.34	1.64
Other	2.21	1.87	1.67

Map Legend

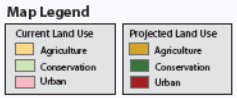
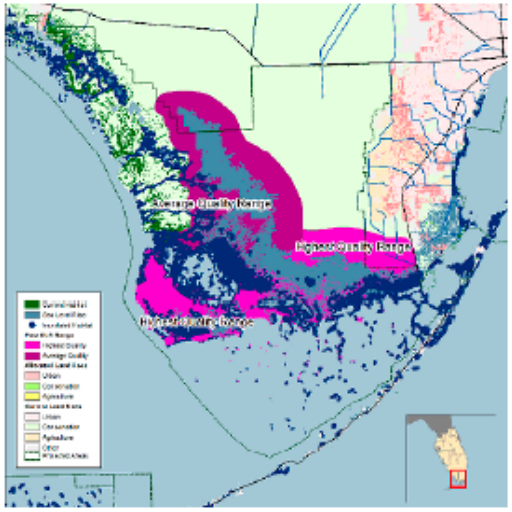


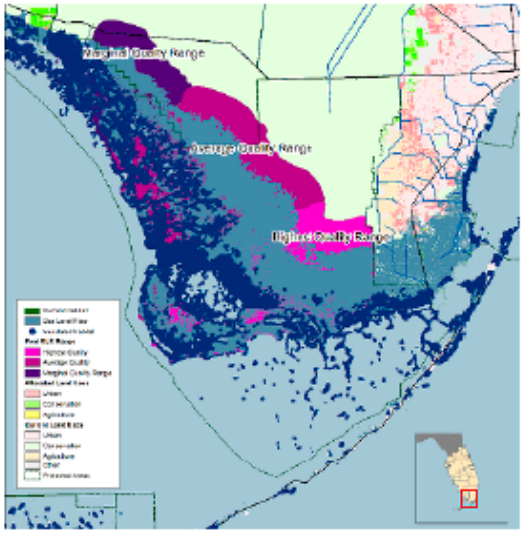
Figure 10: MIT Scenario Summary

Crocodile Distribution 2060

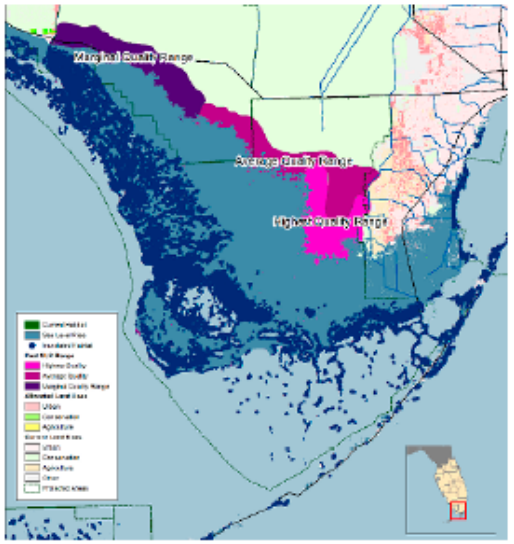
Sea Level Rise



Low

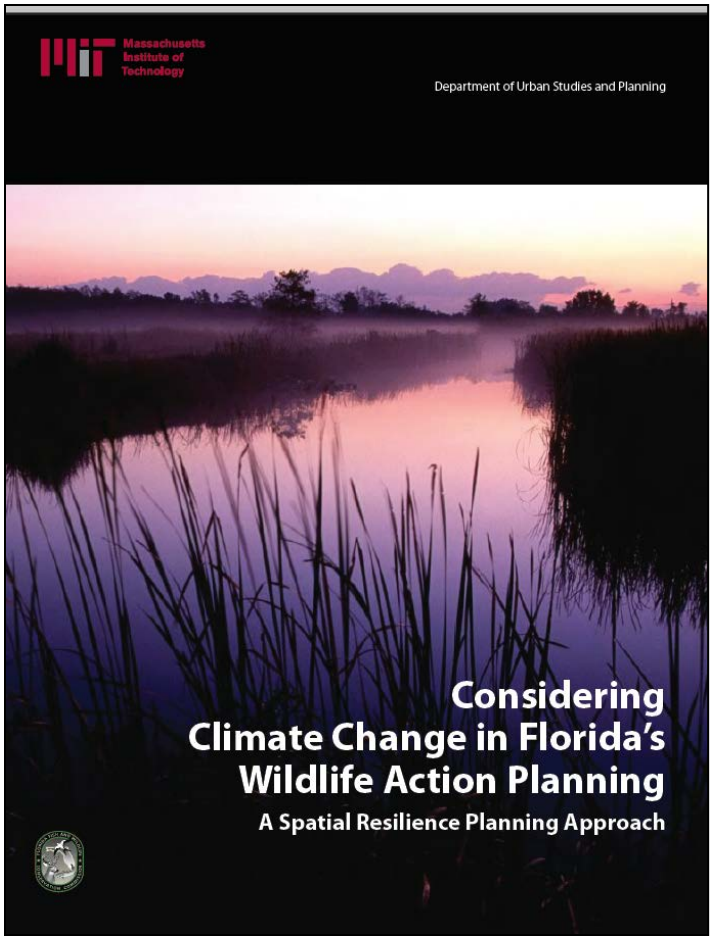


Medium



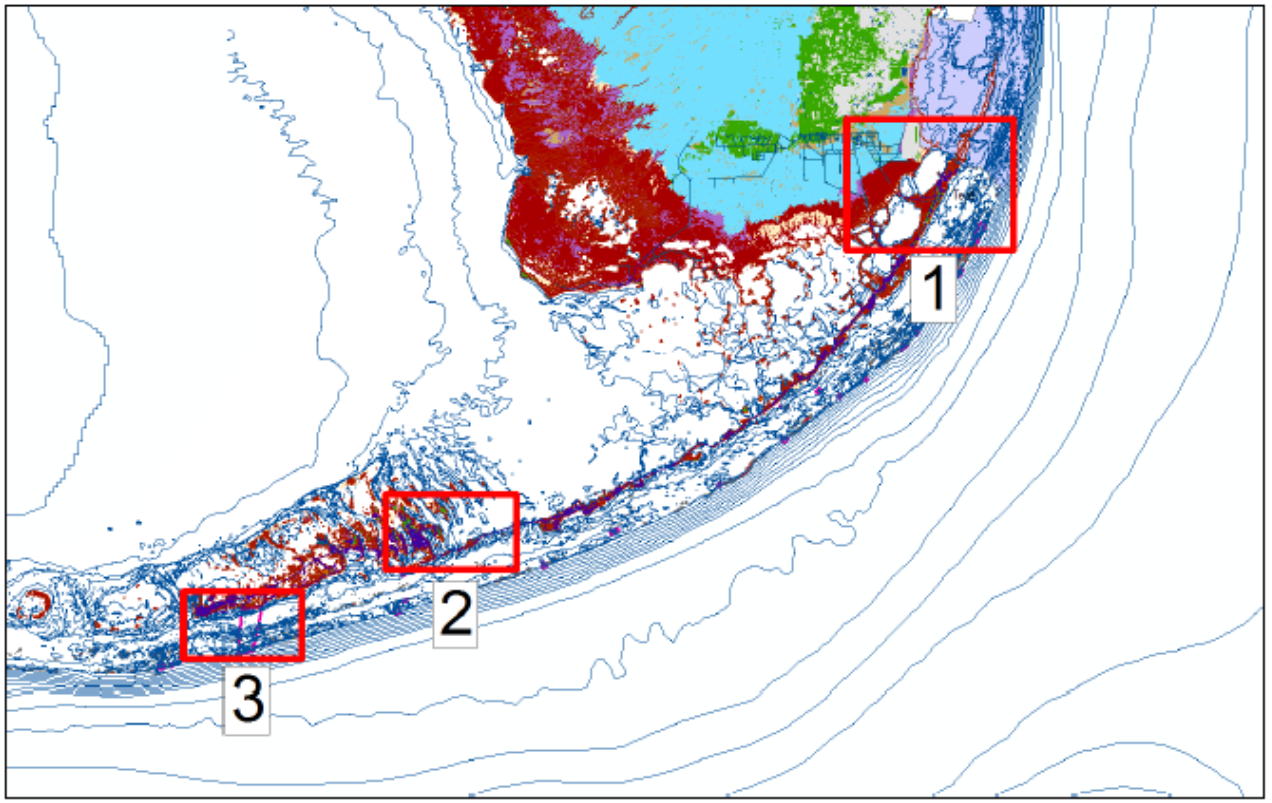
High

How Alternative Future Scenarios are Used in the Terrestrial Climate Change Adaptation Planning



KEYSMAP (Florida Keys Marine Adaptation Planning)

The KeysMAP Study Area



Workshop-Driven Process

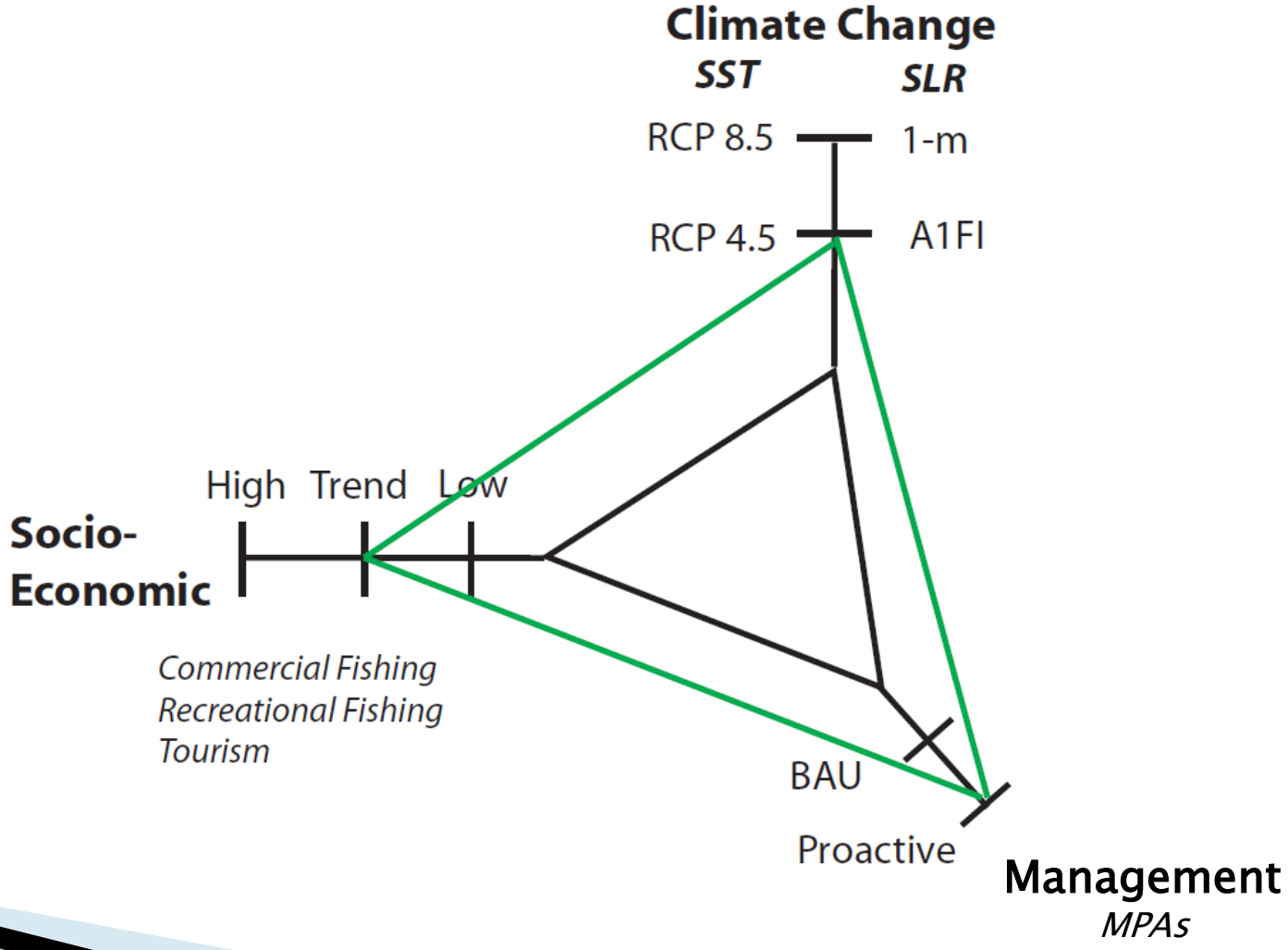
Workshop 1 – Managers
Develop Scenarios

Workshop 2 – Habitat Specialists
Examine Effects on Habitats

Workshop 3 – Species Specialists
Examine Effects on Species

Workshop 4 – Managers Reconvene
to Discuss Management Options
under the Different Scenarios

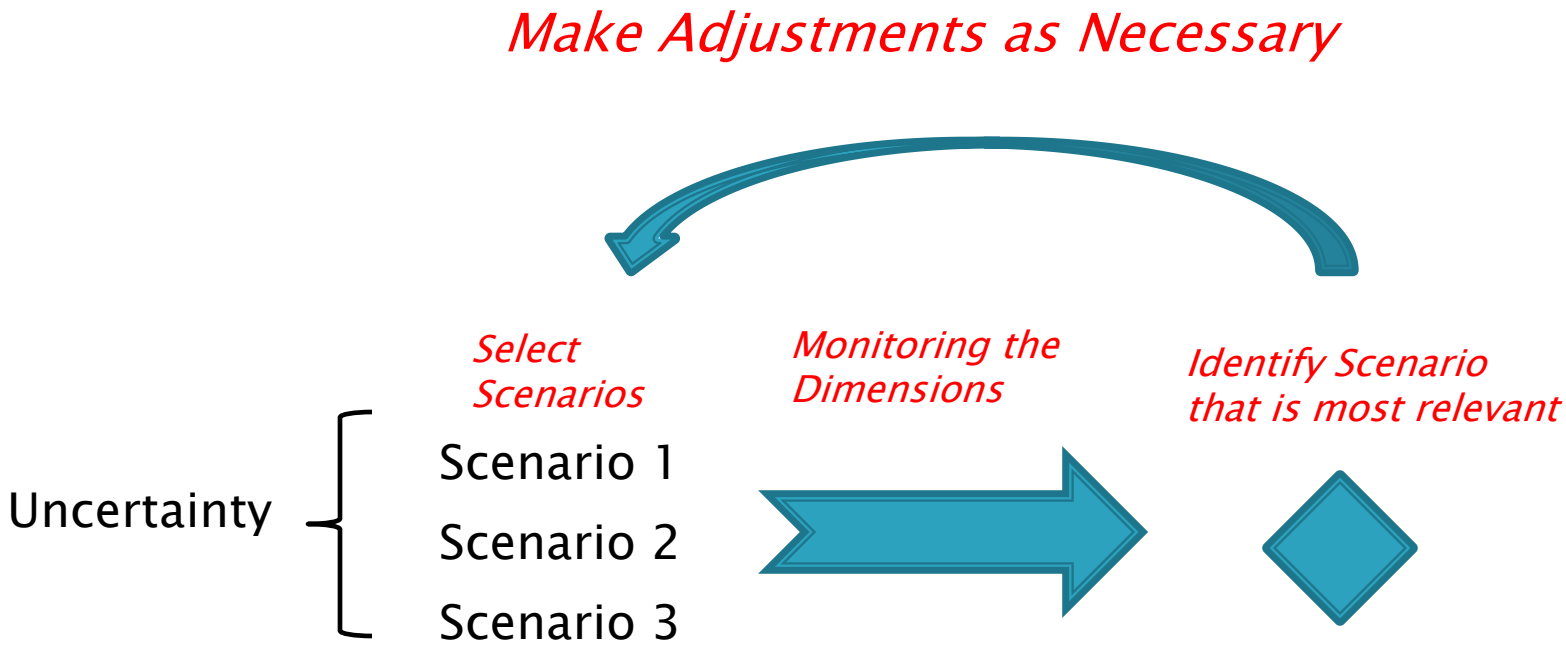
The Dimensions of KeysMAP



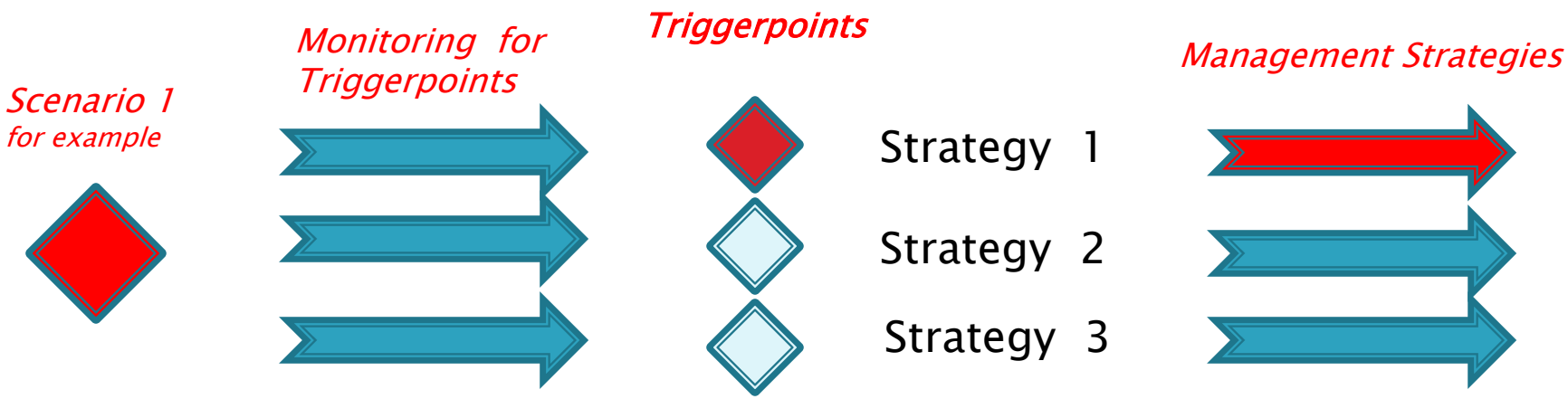
Habitats Under Consideration

Species Under Examination

The Conceptual Approach (Step 1)

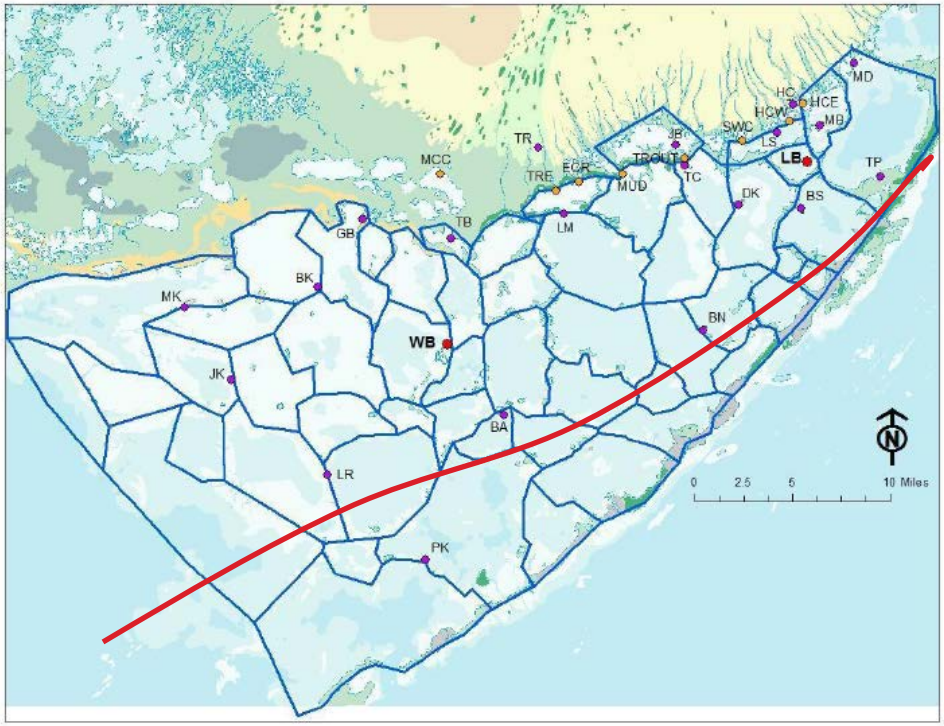


The Conceptual Approach (Step 2)



A KeysMAP Example Monitoring for Change

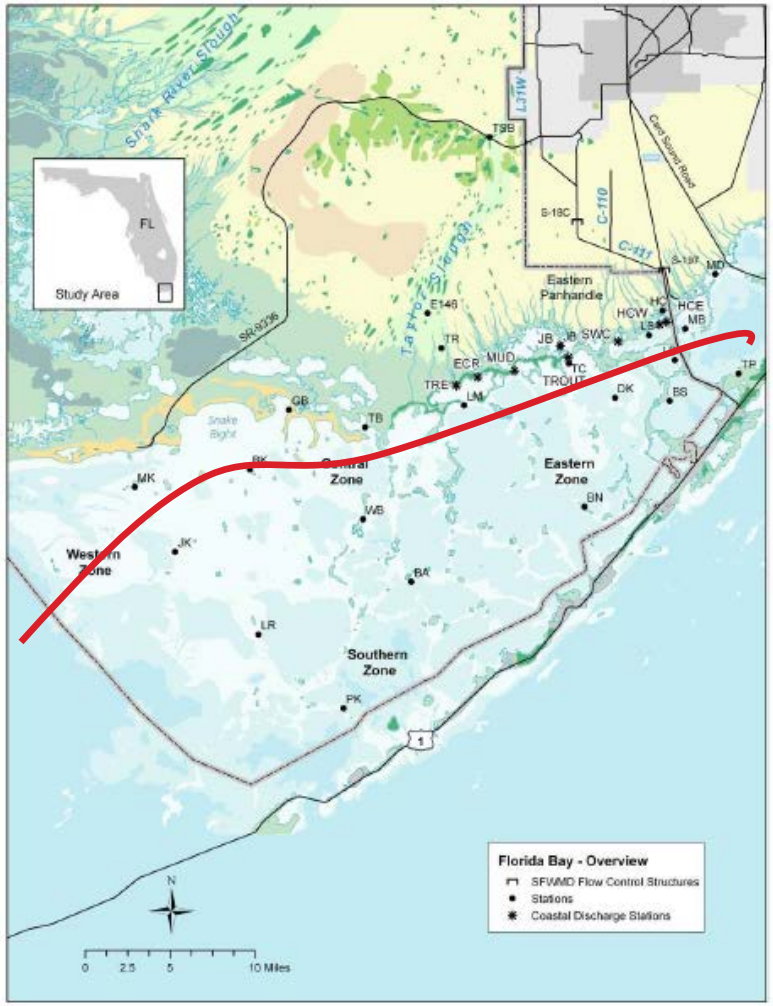
(spiny lobster)



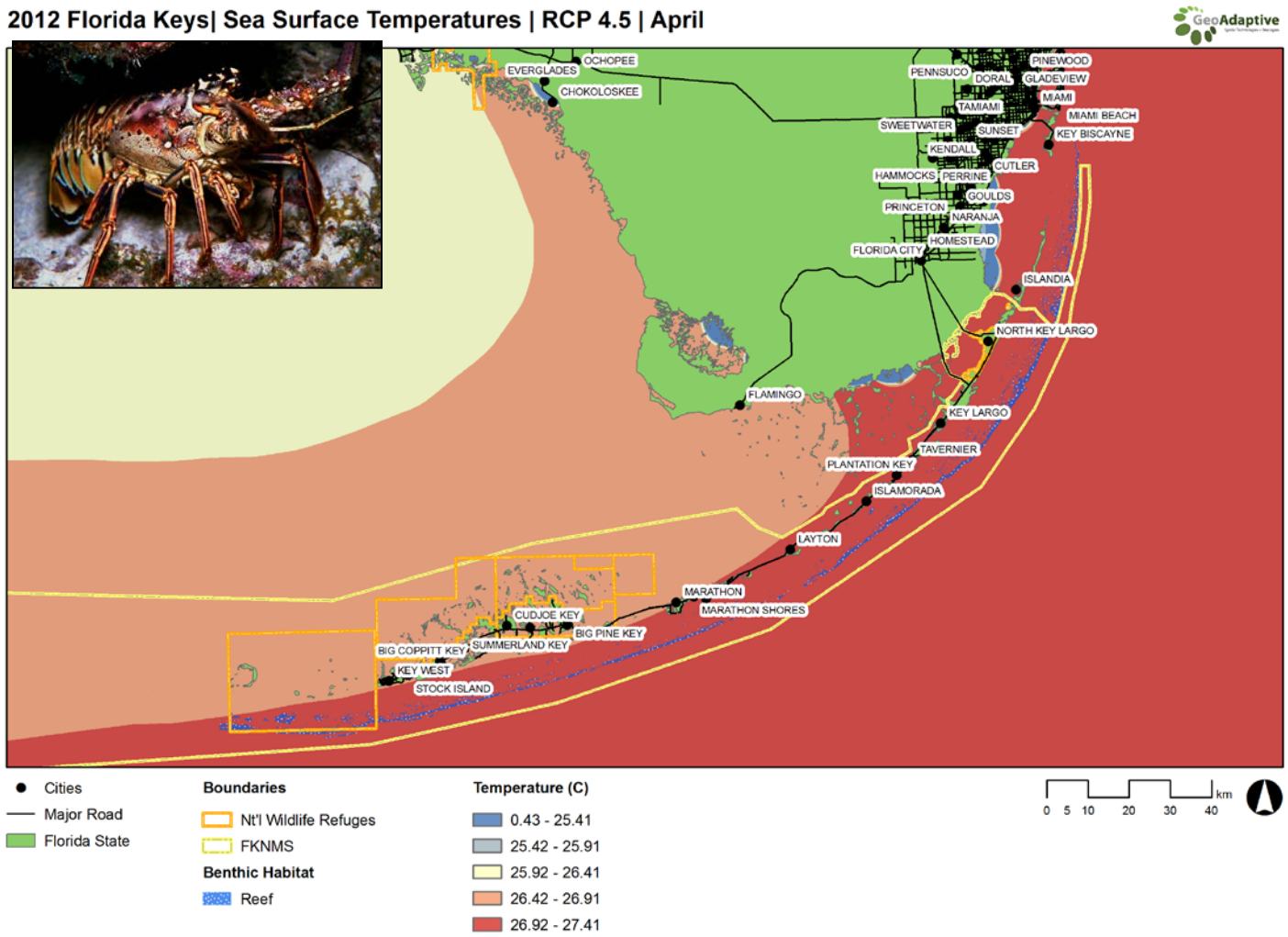
Larvae are limited by
1. Salinity
2. Temperature

Everglades National Park
South Florida Natural Resources Center

…under Sea Level Rise



Management Action – Change Harvest Regime



Take Home Messages

- Spatial scenario planning can
  1. Account for multiple sources of uncertainty

  2. Be flexible and updated as new data become available and new policies are developed

  3. Provide a framework for monitoring programs to trigger management actions

  4. Spatial scenario planning can provide a framework for managers to think outside the box

Thanks

Florida Fish and Wildlife Conservation Commission

GeoAdaptive
Spatial Technologies + Strategies

NOAA
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

The Nature Conservancy